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New Tool Helps Researchers, Managers Plan for Sea Scallop Fishery in the Future

Sea scallops, one of the most valuable commercial fisheries in the United States, are a well managed and monitored fishery, yet little is known about how changing ocean temperatures and ocean chemistry and other environmental factors could impact the fishery. A new study published May 6 in PLOS ONE describes a new computer model to help inform scallop management discussions and decisions in the coming decades.

Researchers from the Woods Hole Oceanographic Institution (WHOI), NOAA Fisheries' Northeast Fisheries Science Center (NEFSC), and Ocean Conservancy developed an integrated assessment model (IAM) to reproduce scallop population dynamics, market dynamics and seawater chemistry between 2000 and 2012. Data on actual landings, revenue, biomass, number and scallop size distribution were provided by NOAA's Northeast Fisheries Science Center (NEFSC), along with ocean temperature, salinity and other oceanographic information.

Ocean acidification is a series of chemical changes in the ocean caused by the uptake of atmospheric CO₂. It affects marine resources, especially shellfish, made of calcium carbonate, and could affect the Atlantic sea scallop (*Placopecten magellanicus*).

"Ocean acidification is happening on the Northeast U.S. Shelf and this study develops an integrated model to evaluate the impacts of ocean acidification on one of the most valuable fisheries in the nation," said Jon Hare, head of the oceanography branch at NOAA's Northeast Fisheries Science Center and a co-author of the study. "There is still a lot of work to be done, but this tool represents a significant step forward through the development of an integrated biogeochemical, population, bioeconomic model."

The study brought together a number of factors over different time scales into a single model to look at long-term implications of changing ocean chemistry and warming temperatures on sea scallops. The new computer model is the first developed for public use and will eventually be available on an interactive website, where anyone interested in fisheries management can look at different environmental, management and market scenarios and see how the various factors impact the fishery.

Researchers to date have looked at only one climate scenario with the model: a business- as-usual scenario. Using current harvest levels and carbon dioxide emissions, sea scallop harvest could decline over the next several decades and landings could decrease. The authors note that this is just one possible scenario and that additional scenarios need to be evaluated. The authors also state that more detailed information is needed regarding the impacts of warming and ocean acidification on Atlantic sea scallops.

“Studies on other sea scallop species were used to simulate the effects of ocean acidification on the Atlantic sea scallop,” Hare said. “Laboratory studies specific to Atlantic sea scallops are needed to improve the model.”

Careful management appears to be the most powerful short-term factor affecting scallop populations, but researchers note that environmental change in the coming decades will increasingly influence scallops as bottom temperatures rise and ocean acidification continues.

“The model lets us will look at a fishery that is doing well and see what changes the future might bring under different scenarios,” said Dvora Hart, who leads the scallop stock assessment for NOAA’s Northeast Fisheries Science Center laboratory in Woods Hole, Mass. “It also allows for informed decisions that plan for both the short and long-term.”

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Atlantic sea scallop:

http://www.fishwatch.gov/seafood_profiles/species/scallop/species_pages/atlantic_sea_scallop.htm

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